Biosensors for Exploration Medical System

Completed Technology Project (2011 - 2014)

Project Introduction

The current International Space Station (ISS) ECG (electrocardiogram) system for donning the biomedical sensors is time consuming and inconvenient, requiring shaving, application of electrodes, and signal checks. A more efficient ECG system will save crew time and reduce the overhead of stowing additional supplies. Additionally, the current ECG hardware requires dedicated ISS power and significant volume, but advances in microelectronics has significantly reduced the volume and power required for ECG applications. The Biosensors-EMSD (Exploration Medical System Demonstration) will demonstrate the integration of small, battery powered, easy to use biomedical sensors and data acquisition devices that will have the ability to measure, store, and transmit physiologic parameters during operational and ambulatory scenarios. Specific Aims: 1. Demonstrate that commercial off the shelf (COTS) and emerging technologies satisfy exploration physiological monitoring requirements and operational requirements 2. Reduce the time required of an on-orbit crew and ground personnel to store, access, transfer, and process physiological data 3. Provide a mechanism for interfacing biomedical sensor technology with a common data management framework and architecture to enable the EMSD objectives. The functionality of the ECG system will be verified through a ground demonstration and an ISS flight demonstration, both as part of the Exploration Medical System Demonstration. The project will begin with a market survey of available COTS ECG systems that meet physiological monitoring requirements followed by a direct COTS procurement. The ECG system will then be tested and verified for proper capabilities by CMO analogs. Ground testing will require CMO analogs to don the ECG system and execute a series of predetermined tasks while a variety of ECG data and video is collected. ECG data and video will be examined to ensure data quality, appropriate data routing, and to demonstrate system efficiency. Flight testing will be similar to ground testing, but may not be as comprehensive given in-flight resource limitations. The availability of more varied medical condition simulations, more extensive supply of power, fewer time and space limitations, and enhanced system characterization capabilities will allow the ground demonstration to expand the on-orbit objectives by assessing system effectiveness and performance.

Anticipated Benefits

Our purpose is to better equip crew member medical monitoring for future exploration missions.

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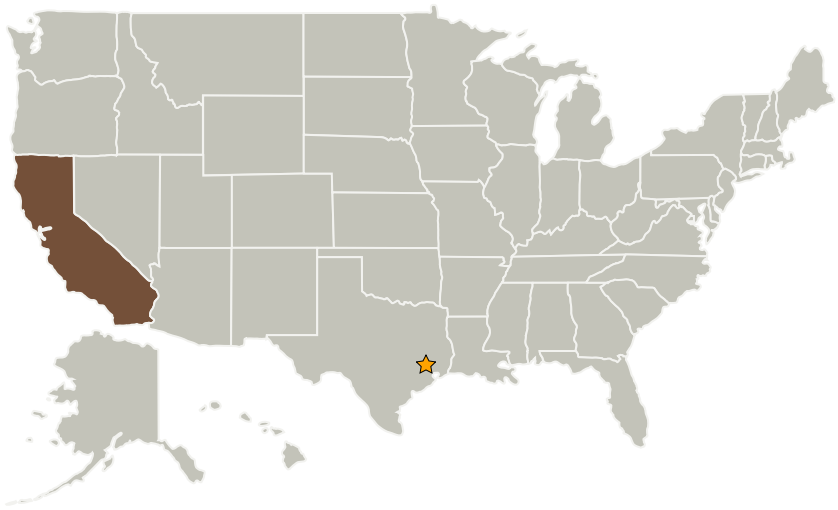
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Howard & Houston Engineering	Supporting Organization	Industry	

Primary U.S. Work Locations
California

Project Transitions

July 2011: Project Start

January 2014: Closed out

Closeout Summary: New project for FY2011. [Ed. note: Task added to Task Bo ok when received information in August 2013] NOTE (5/21/2014): Sean Winther took over the project in early 2014; Original PI was Fritz Moore. See "Biosensors for Exploration Medical System (PI=Winther)" for subsequent reporting.

Organizational Responsibility

Responsible Mission Directorate:

Space Operations Mission Directorate (SOMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Human Spaceflight Capabilities

Project Management

Program Director:

David K Baumann

Project Manager:

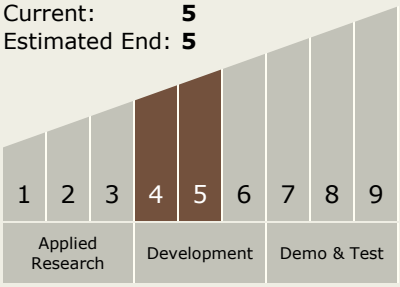
Sharmila D Watkins

Principal Investigator:

Fritz B Moore

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Project Website:

https://taskbook.nasaprs.com

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.4 Contact-less / Wearable Human Health and Performance Monitoring

Target Destinations

The Moon, Mars